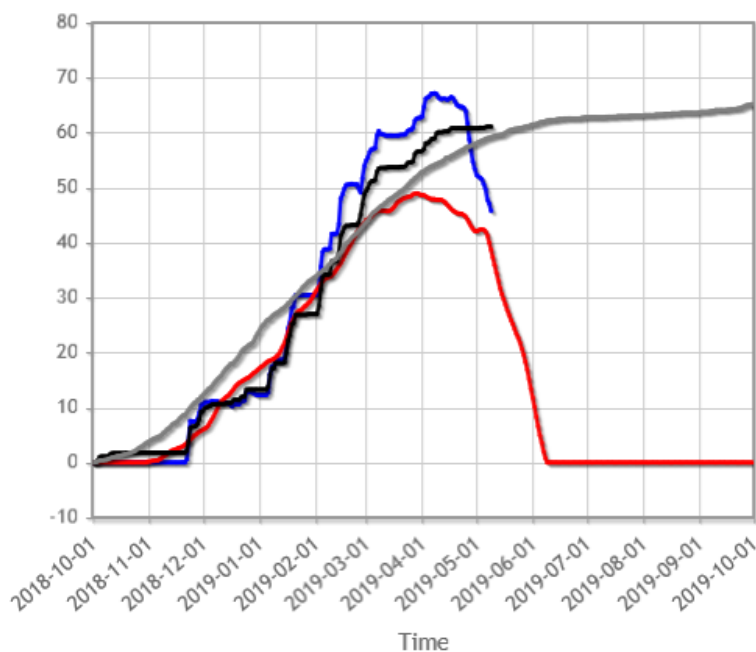


California Water Supply Outlook Report

May 1, 2019



Squaw Valley G.C. (784) California SNOTEL Site - 8013 ft Reporting Frequency: Daily; Date Range: 2018-10-01 to 2019-01-01



Top: Looking ~SSE towards Lake Tahoe. Photo was taken April 28, 2019, when snow depth measured 95 inches at the Squaw Valley SNOTEL site located in the Lake Tahoe forecast basin at 8,013 ft elevation ("SV"). The Snow Water Equivalent (SWE) at the site was 132 percent of the April 28 median. For comparison, the average SWEs for the northern Sierras and for the state were 146- and 145 percent of the April 28 median, respectively.

Left: Precipitation and snowpack data from the Squaw Valley SNOTEL site show how storms in February boosted precipitation and snowpack to above normal levels. As at Squaw Valley, the entire Sierra Nevada range has experienced a robust water year.

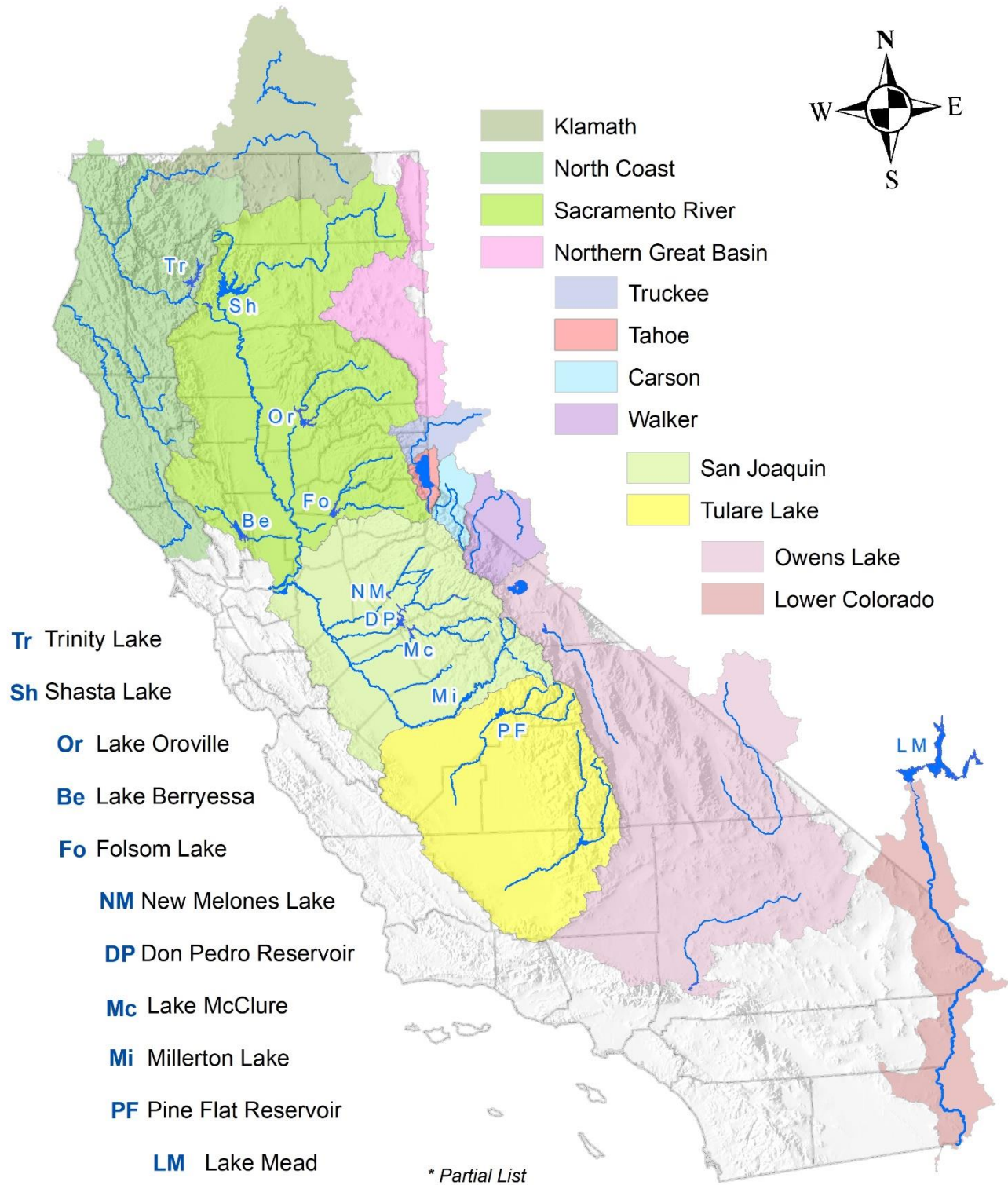
Graph by the NRCS Water and Climate Center is online at:
https://wcc.sc.egov.usda.gov/reportGenerator/view/customChartReport/daily/784:CA::SNTL%7Cid=%22%22%7Cname/CurrentWY,CurrentWYEnd/WTEQ::value,WTEQ::median_1981,PREC::value,PREC::average_1981?fitToScreen=false

■ Snow Water Equivalent (in) Start of Day Values
■ Median Snow Water Equivalent (1981-2010) (in) Start of Day Values
■ Precipitation Accumulation (in) Start of Day Values
■ Average Precipitation Accumulation (1981-2010) (in) Start of Day Values

Contents

California Forecast Basins, Major Rivers, and Large Reservoirs (Map).....	3
State of California General Outlook	4
Streamflow Forecasts:	
Sacramento River Basin	5
San Joaquin River Basin	8
Tulare Lake Basin	10
North Coastal Area Basin	11
Klamath Basin	12
Lake Tahoe Basin	14
Truckee River Basin	16
Carson River Basin	18
Walker River Basin	20
Owens River Basin	22
Northern Great Basin	23
Lower Colorado River Basin	24
How Forecasts are Made	25

California Forecast Basins, Major Rivers, and Large Reservoirs*



STATE OF CALIFORNIA GENERAL OUTLOOK

May 1, 2019

SUMMARY

California wrapped up the winter season with a robust snowpack; by the end of April, statewide snowpack averaged 143 percent of normal. In terms of precipitation, April was comparatively dry, although above average precipitation in January, February, and March helped keep the cumulative totals 20- to 30 percent above average for the season through April. Reservoir storage (not including the Colorado River) stood at 114 percent of average for April 30th, which is slightly higher than total storage at the end of March.

SNOWPACK

Snow gages in the northern-, central-, and southern mountains recorded snow water equivalents on April 30th that averaged 144-, 145-, and 139 percent of normal, respectively. A dip in the jet stream forecast for this coming 3rd week in May portends the return of colder conditions and snow at higher elevations, which could help slow the rate of snowpack decline across most or all of the Sierras through the spring.

More information is available online at

<http://cdec.water.ca.gov/snow/current/snow/index2.html>.

PRECIPITATION

The precipitation index in the Northern Sierra region was 3.8 inches in April, which is 102 percent of the monthly average. Meanwhile, rainfall totals further south were below average; the precipitation indices for the San Joaquin- and Tulare Basin regions 45-, and 24 percent of monthly average respectively.

More information is available online at http://cdec.water.ca.gov/snow_rain.html

RESERVOIRS

Total reservoir storage (excluding Lake Powell and Lake Mead) as of March 31st stood at 114 percent of average, including 109- and 130 percent at Shasta and New Melones, respectively. Storage in Lake Mead was 54 percent of the month-end average, although snowpack in the Colorado River basin remains healthy and forecast inflows into Lake Powell between May and July are 139 percent of average.

More information is available online at http://cdec.water.ca.gov/snow/reservoir_ss.html.

STREAMFLOW

Streamflow forecasts by the National Weather Service (NWS) and the California Department of Water Resources (DWR), for stations in the Sacramento, San Joaquin, Tulare, and North Coast basins range between 105- and 192 percent between April and July. May through July forecasts by NRCS for stations in the Tahoe, Truckee, Carson, and Walker River basins range between 172- and 291 percent of average. Summaries are provided below.

Sacramento River Basin

National Weather Service (NWS) streamflow forecasts at 13 sites range between 105- and 171 percent of average between April and July (APR-JUL). California Department of Water Resources' (DWR's) APR-JUL stream forecasts at 18 sites in the basin range between 145- and 177 percent of average.

SACRAMENTO RIVER BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast								
Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Sacramento R at Shasta (DWR)	APR-JUL			470	159			295
Sacramento R at Shasta (NWS)	APR-JUL	519	524	534	171	543	567	312
McCloud R ab Shasta (DWR)	APR-JUL			550	145			379
McCloud R ab Shasta (NWS)	APR-JUL	526	529	534	141	540	555	379
Pit R at Shasta Lk (DWR)	APR-JUL			1520	149			1020
Pit R at Shasta Lk (NWS)	APR-JUL	1277	1295	1330	131	1375	1468	1013
Inflow to Shasta Lk (DWR)	APR-JUL	2300		2670	152		2980	1756
	OCT-SEP	6770		7205	124		7570	5831
Inflow to Shasta Lk (NWS)	APR-JUL	2585	2608	2658	147	2724	2863	1803
Sacramento R nr Red Bluff (DWR)	APR-JUL	3150		3770	156		2980	2421
	OCT-SEP	10410		11130	130		11860	8544
Sacramento R nr Red Bluff (NWS)	APR-JUL	3702	3739	3793	153	3893	4079	2479

Sacramento River Basin, cont'd

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Feather R at Lk Almanor (DWR)	APR-JUL			590	177			333
NF Feather R at Pulga (DWR)	APR-JUL			1810	176			1028
NF Feather R nr Prattville (NWS)	APR-JUL	334	340	350	105	360	378	333
MF Feather R nr Clio (DWR)	APR-JUL			150	174			86
SF Feather R at Ponderosa Dam (DWR)	APR-JUL			190	173			110
Inflow to Oroville Res (DWR)	APR-JUL	2530		3000	176		3420	1704
	OCT-SEP	5745		6255	142		6710	4407
Inflow to Oroville Res (NWS)	APR-JUL	2824	2860	2920	172	2988	3207	1701
N Yuba R bl Goodyears Bar (DWR)	APR-JUL			450	161			279
N Yuba R bl Goodyears Bar (NWS)	APR-JUL	404	411	418	153	429	461	273
Inflow Jackson Mdws & Bowman Res (DWR)	APR-JUL			180	161			112
S Yuba R nr Langs Crossing (DWR)	APR-JUL			380	163			233
Yuba R at Smartville (DWR)	APR-JUL	1310		1570	162		1840	968
	OCT-SEP	2795		3070	135		3360	2268
Yuba R at Smartville (NWS)	APR-JUL	1454	1473	1504	153	1546	1656	981

Sacramento River Basin, cont'd

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
NF American R at N FK Dam (DWR)	APR-JUL			430	164			262
MF American R nr Auburn (DWR)	APR-JUL			870	167			522
MF American R nr Auburn (NWS)	APR-JUL	783	798	815	166	836	871	490
Inflow to Union Valley Res (NWS)	APR-JUL	160	164	168	171	174	184	98
Silver Ck bl Camino Div. Dam (DWR)	APR-JUL			280	162			173
Silver Ck bl Camino Div. Dam (NWS)	APR-JUL	245	251	258	164	269	283	158
Inflow to Folsom Res (DWR)	APR-JUL	1700		1990	166		2390	1199
	OCT-SEP	3610		3910	149		4330	2626
Inflow to Folsom Res (NWS)	APR-JUL	1924	1964	2012	163	2063	2153	1232

The average is based on the 1981-2010 reference period.

- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

San Joaquin River Basin

National Weather Service (NWS) streamflow forecasts at eight sites range between 142- and 188 percent of average between April and July (APR-JUL). California Department of Water Resources' (DWR's) APR-JUL stream forecasts at 12 sites in the basin range between 140- and 192 percent of average.

SAN JOAQUIN RIVER BASIN Streamflow Forecasts - February 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Cherry & Eleanor Cks, Hetch Hetchy (DWR) APR-JUL			460	146			315
Tuolumne R nr Hetch Hetchy (DWR) APR-JUL			890	147			604
Tuolumne R nr Hetch Hetchy (NWS) APR-JUL	810	825	846	142	880	919	596
Cosumnes R at Michigan Bar (DWR) APR-JUL	200		240	192		325	125
OCT-SEP	650		695	183		785	379
Cosumnes R at Michigan Bar (NWS) APR-JUL	236	238	242	188	248	261	128
NF Mokelumne R nr West Point (DWR) APR-JUL			690	158			437
Inflow to Pardee Res (DWR) APR-JUL	620		730	160		860	457
OCT-SEP	990		1105	148		1240	748
Inflow to Pardee Res (NWS) APR-JUL	642	656	675	145	702	750	467
MF Stanislaus R bl Beardsley (DWR) APR-JUL			520	156			334
Inflow to New Melones Res (DWR) APR-SEP	950		1080	158		1270	682
OCT-SEP	1610		1745	152		1945	1149
Inflow to New Melones Res (NWS) APR-JUL	973	995	1026	149	1061	1131	690

San Joaquin River Basin, cont'd

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Inflow to New Don Pedro Res (DWR)								
	APR-JUL	1570		1770	148		2040	1193
	OCT-SEP	1280		2725	143		3005	1909
Inflow to New Don Pedro Res (NWS)								
	APR-JUL	1698	1720	1768	144	1844	1965	1228
Merced R, Pohono Bridge Yosemite (DWR)								
	APR-JUL			520	140			372
Merced R, Pohono Bridge Yosemite (NWS)								
	APR-JUL	549	562	577	150	594	625	384
Inflow to Lake McClure (NWS)								
	APR-JUL	910	930	956	149	985	1041	642
San Joaquin R at Mammoth Pool (DWR)								
	APR-JUL			1450	141			1026
Big Ck bl Huntington Lk (DWR)								
	APR-JUL			135	148			91
SF San Joaquin R nr Florence Lk (DWR)								
	APR-JUL			290	144			201
Inflow to Millerton Lk (DWR)								
	APR-JUL	1510		1760	143		2030	1228
	OCT-SEP	2180		2445	136		2730	1793
Inflow to Millerton Lk (NWS)								
	APR-JUL	1851	1902	1948	155	2028	2119	1258

The average is based on the 1981-2010 reference period.

- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Tulare Lake Basin

National Weather Service (NWS) streamflow forecasts at four sites range between 153- and 193 percent of average between April and July (APR-JUL). California Department of Water Resources' (DWR's) APR-JUL stream forecasts at six sites in the basin range between 151- and 170 percent of average.

TULARE LAKE BASIN Streamflow Forecasts - May 1, 2019_____

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
NF Kings R nr Cliff Camp (DWR)	APR-JUL			360	151			239
Inflow to Pine Flat Res (DWR)	APR-JUL	1600		1830	151		2110	1210
	OCT-SEP	2230		2475	145		2770	1702
Inflow to Pine Flat Res (NWS)	APR-JUL	1835	1901	1940	158	2019	2076	1231
Kaweah R at Terminus Res (DWR)	APR-JUL	360		430	151		490	285
	OCT-SEP	565		640	142		705	451
Kaweah R at Terminus Res (NWS)	APR-JUL	441	458	471	164	498	537	288
Tule R at Success Res (DWR)	APR-JUL	80		100	159		130	63
	OCT-SEP	190		215	146		250	147
Tule R at Success Res (NWS)	APR-JUL	91	93	97	153	105	113	63
Kern R nr Kernville (DWR)	APR-JUL			640	167			384
Inflow to Isabella Res (DWR)	APR-JUL	680		780	170		930	458
	OCT-SEP	985		1095	150		1260	728
Inflow to Isabella Res (NWS)	APR-JUL	828	846	878	193	936	972	454

The average is based on the 1981-2010 reference period.

- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

North Coastal Area Basin

The National Weather Service's (NWS') and California Department of Water Resources' (DWR's) APR-JUL streamflow forecasts on the Trinity River are 142- and 158 percent of average, respectively. The NWS' APR-JUL streamflow forecast for the Scott River near Fort Jones is 146 percent of average.

NORTH COASTAL AREA Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Trinity R at Lewiston (DWR)								
	APR-JUL	830		1010	158		1180	639
	OCT-SEP	1475		1660	123		1835	1348
Inflow to Clair Engle Lk (NWS)								
	APR-JUL	917	928	946	142	975	1033	666
Scott R nr Fort Jones (NWS)								
	APR-JUL	242	246	252	146	258	270	173

The average is based on the 1981-2010 reference period.

- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Klamath Basin

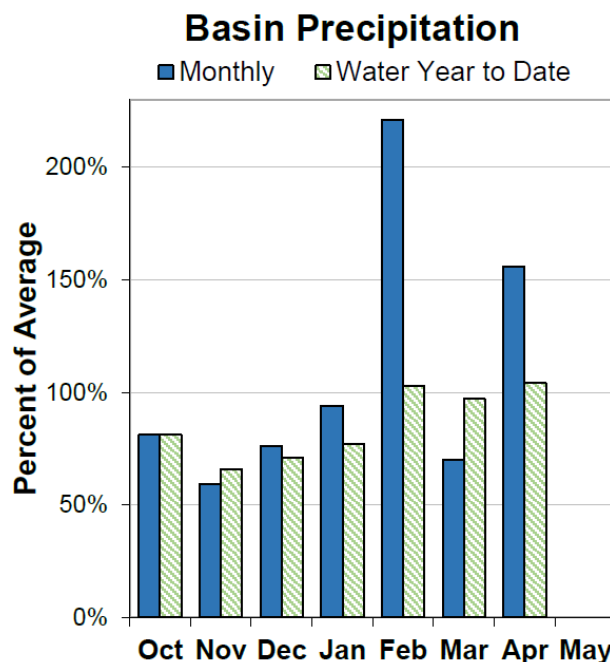
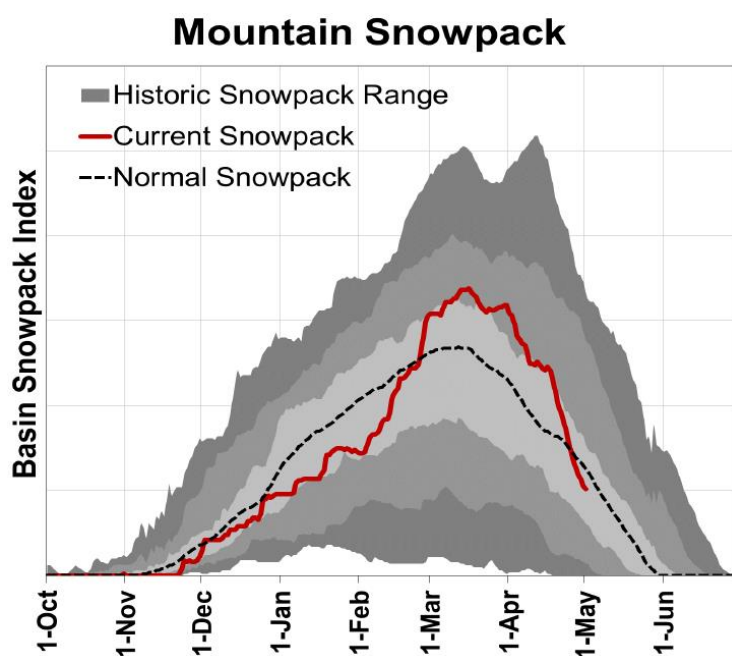
Including information from the Water Supply Outlook Report for Oregon
(https://www.wcc.nrcs.usda.gov/ftpref/states/or/watersupply/2019/WSOR_2019_May.pdf) :

As of May 1, the basin snowpack was 84 percent of normal. In general, SNOTEL sites in the basin reached 100- to 140 percent of normal peak snowpack levels this winter.

April precipitation was 156 percent of average. Precipitation since the beginning of the water year (October 1 - May 1) has been 104 percent of average.

Reservoir storage across the basin is currently above average. As of May 1, storage at major reservoirs in the basin ranges from 111 percent of average at Clear Lake to 140 percent of average at Gerber Reservoir.

The May through September (MAY-SEP) streamflow forecasts in the basin range from 95 percent to 122 percent of average.



Klamath Basin (cont'd)

KLAMATH BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Gerber Res Inflow (2)								
	MAY-JUL	0.88	3.6	6.6	122	10.4	17.6	5.4
	MAY-SEP	1.05	4.0	7.1	122	11.1	18.5	5.8
Sprague R nr Chiloquin								
	MAY-JUL	79	103	119	101	135	159	118
	MAY-SEP	101	126	143	101	160	185	141
Williamson R bl Sprague R								
	MAY-JUL	134	161	180	96	199	225	187
	MAY-SEP	190	220	240	98	260	290	245
Upper Klamath Lake Inflow								
	MAY-JUL	141	200	225	94	255	315	240
	MAY-SEP	210	275	305	95	335	405	320

The average is based on the 1981-2010 reference period.

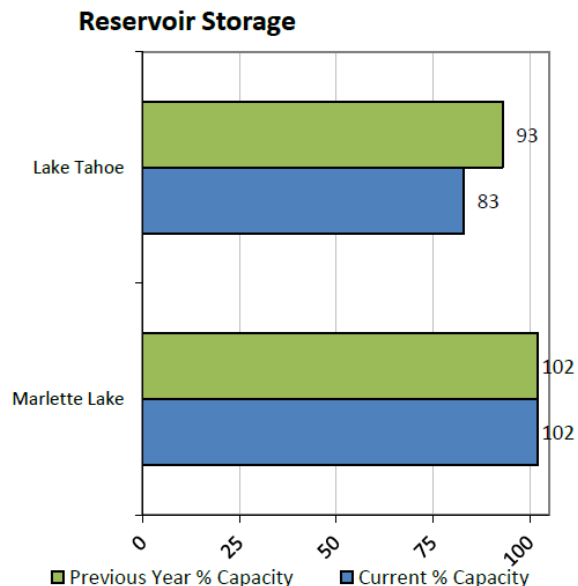
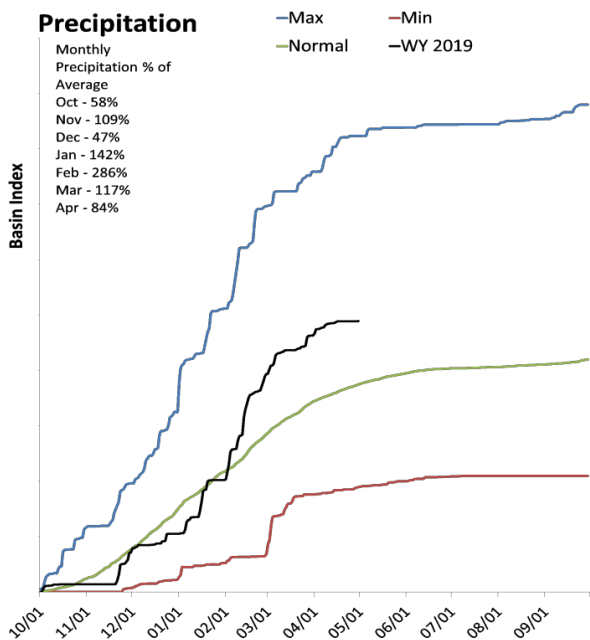
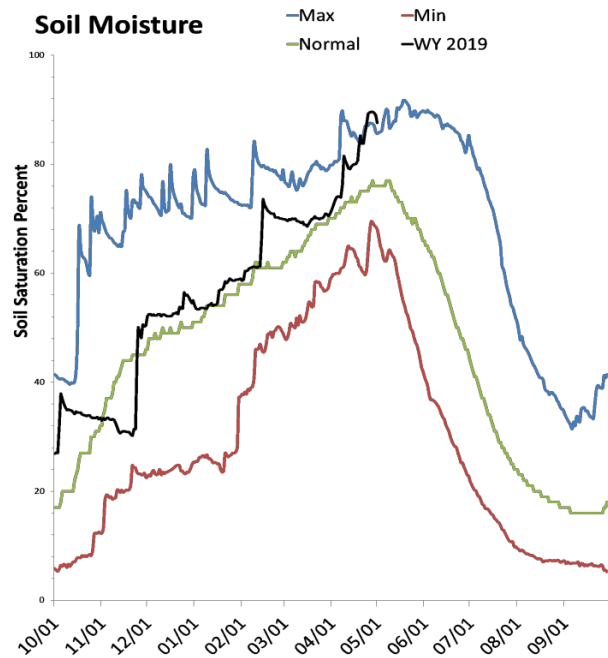
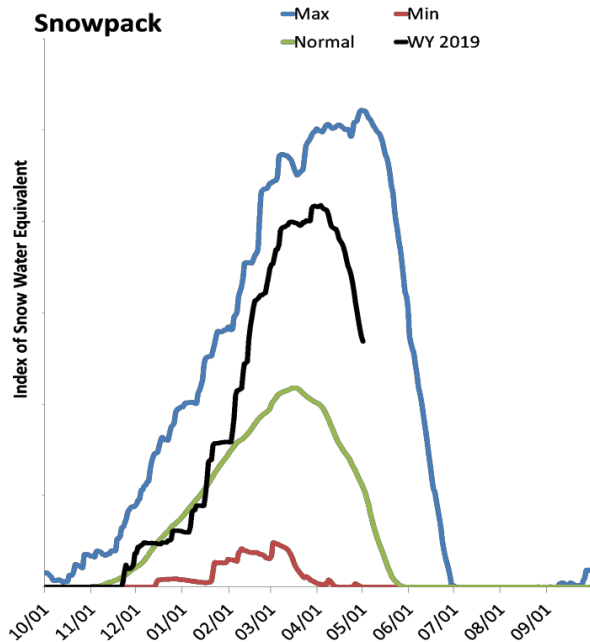
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Lake Tahoe Basin

From the Water Supply Outlook Report for Nevada

(<https://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/>):

Snowpack in the Lake Tahoe Basin is much above normal at 236 percent of median, compared to 41 percent last year. Precipitation in April was below average, which brings the seasonal accumulation (Oct-Apr) to 131 percent of average. Soil moisture is at 88 percent saturation, compared to 85 percent last year. Lake Tahoe's water elevation is 6228.08 ft, which is 5.08 ft above the lake's natural rim and equals a storage of 619.1 thousand acre-feet. Last year its elevation was 6228.68 ft which equaled a storage of 692.9 thousand acre-feet. Lake Tahoe should fill to its legal limit of 6,229.1 ft this summer based on the current lake rise forecasts.



Lake Tahoe Basin (cont'd)

LAKE TAHOE BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Marlette Lk Inflow (Acre-ft)							
APR-JUL	1370	1670	1870	225	2100	2400	830
MAY-JUL	1100	1380	1570	291	1760	2000	540
Lake Tahoe Rise (Gates Closed) (1)							
APR-HIGH	2.00	2.30	2.4	183	2.5	2.8	1.31
MAY-HIGH	1.41	1.61	1.7	157	1.79	1.99	1.08
Lake Tahoe Net Inflow							
APR-JUL	280	306	323	223	340	366	144.6
MAY-JUL	195	220	237	226	254	279	105.0

The average is based on the 1981-2010 reference period.

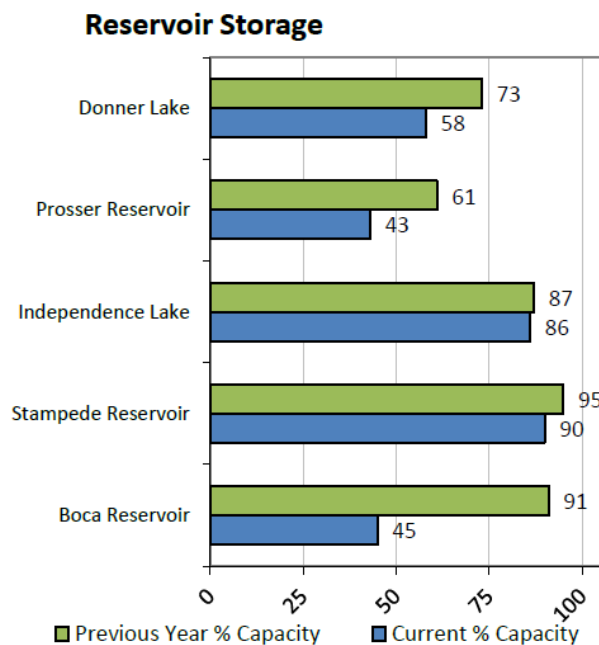
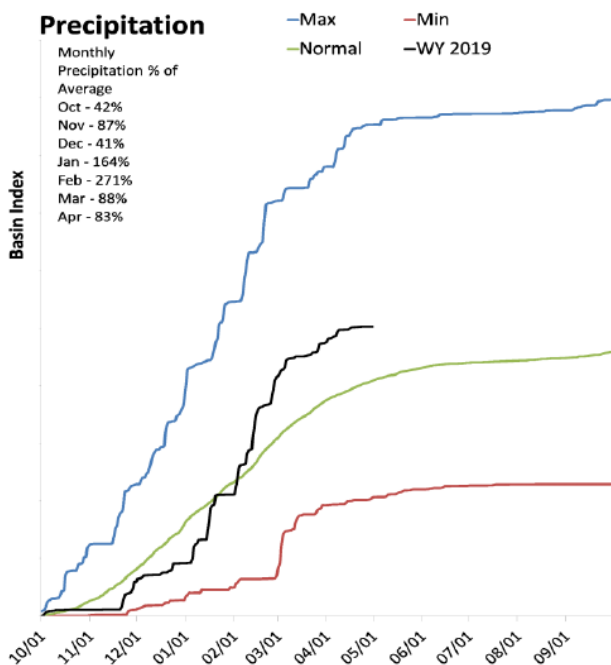
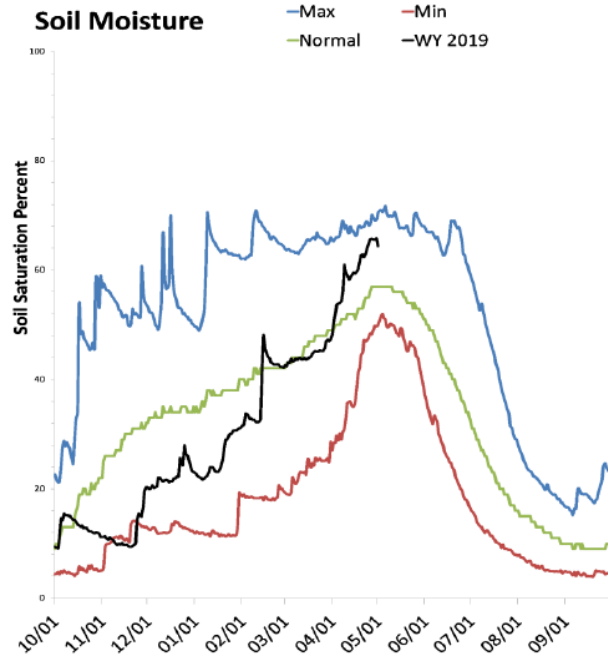
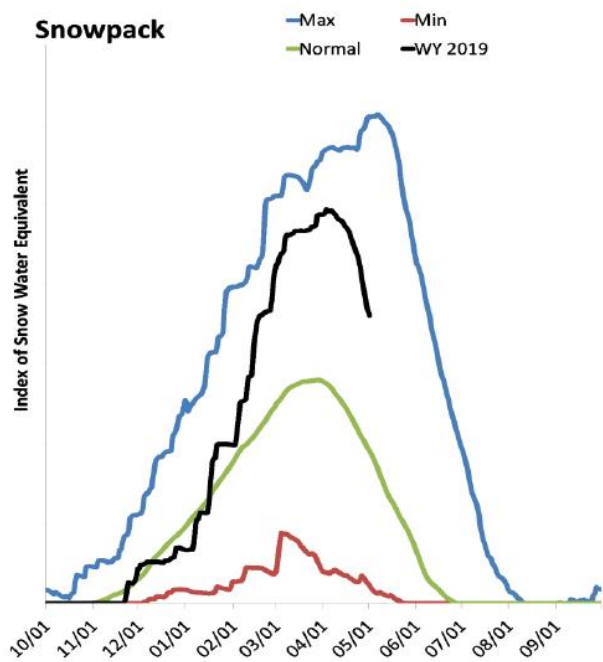
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Truckee River Basin

Including information from the Water Supply Outlook Report for Nevada

(<https://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/>):

Snowpack in the Truckee River Basin is much above normal at 189 percent of median, compared to 64 percent last year. Precipitation in April was below average, which brings the seasonal accumulation (Oct-Apr) to 123 percent of average. Soil moisture is at 65 percent saturation, compared to 61 percent last year. Combined reservoir storage is 79 percent of capacity, compared to 90 percent last year. Forecast streamflow volumes between May and July (MAY-JUL) range from 172- to 290 percent of average.



Truckee River Basin (cont'd)

TRUCKEE RIVER BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Donner Lake Inflow								
	APR-JUL	27	29	31	174	33	35	17.84
	MAY-JUL	17.6	19.6	21	172	22	24	12.24
Martis Ck Res Inflow								
	APR-JUL	20	22	23	245	24	26	9.39
	MAY-JUL	8.8	10.7	12	212	13.3	15.2	5.66
Prosser Ck Res Inflow								
	APR-JUL	78	82	85	198	88	92	42.84
	MAY-JUL	54	58	61	198	64	68	30.84
Independence Lk Inflow								
	APR-JUL	19.7	21	22	182	23	24	12.10
	MAY-JUL	17.0	18.2	21	213	19.8	21	9.88
Sagehen Ck nr Truckee								
	APR-JUL	12.3	13.6	14.5	259	15.5	17.1	5.60
	MAY-JUL	9.8	11.2	12.2	290	13.3	15.1	4.20
Stampede Res Local Inflow								
	APR-JUL	145	155	161	210	167	177	77
	MAY-JUL	90	101	109	200	117	128	54.5
L Truckee R ab Boca Resv								
	APR-JUL	163	173	180	205	187	197	88
	MAY-JUL	99	113	123	198	133	147	62
Boca Res Local Inflow								
	APR-JUL	13.0	15.4	17	309	18.6	21	5.5
	MAY-JUL	2.1	3.2	4.0	198	4.8	5.9	2.02
Truckee R ab Farad Sidewater								
	APR-JUL	207	220	229	212	238	251	108
	MAY-JUL	151	163	171	208	179	191	82.1
Truckee R at Farad								
	APR-JUL	477	503	520	204	537	563	255
	MAY-JUL	311	334	350	191	366	389	183

The average is based on the 1981-2010 reference period.

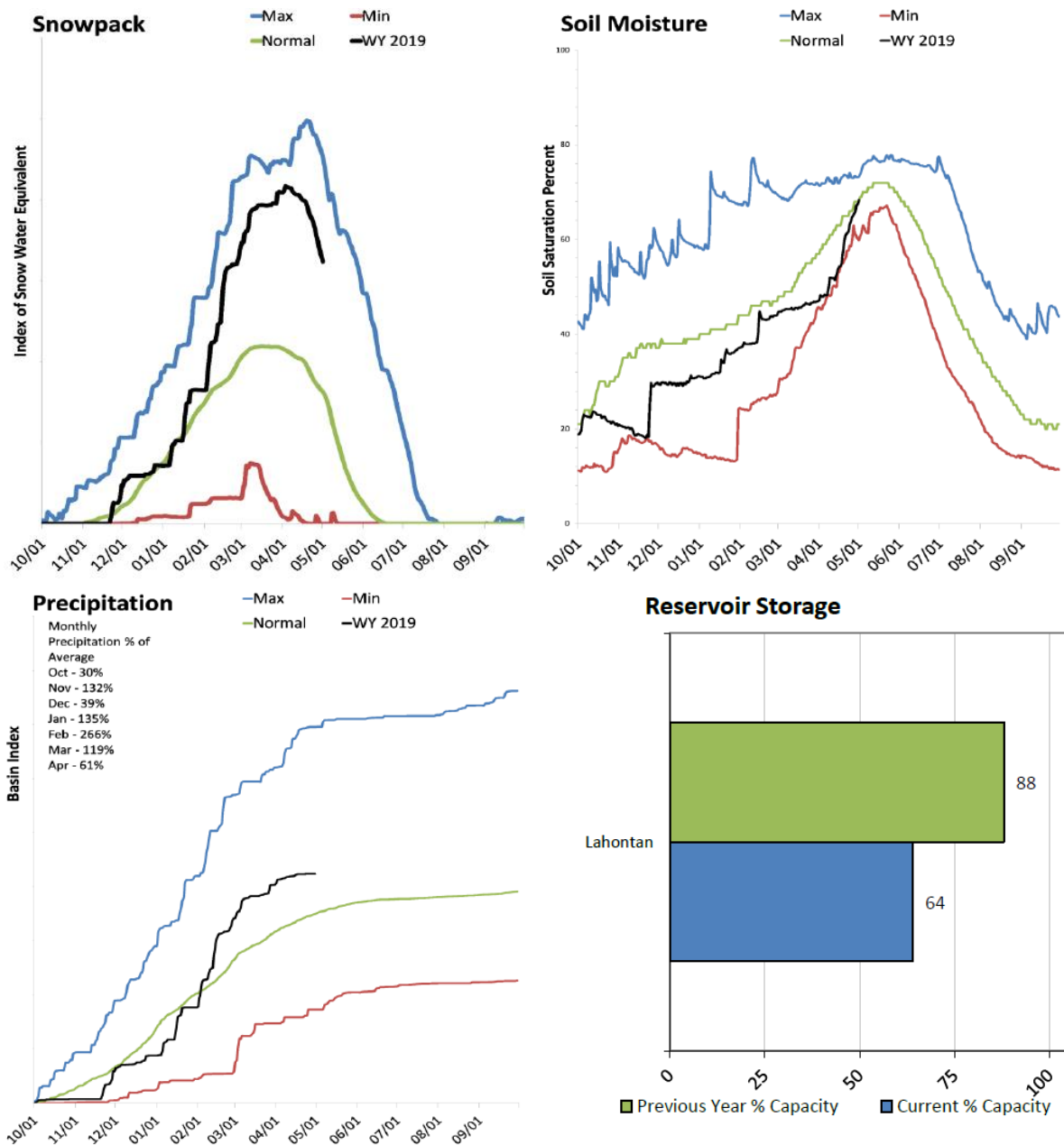
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Carson River Basin

Including information from the Water Supply Outlook Report for Nevada

(<https://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/>):

Snowpack in the Carson River Basin is much above normal at 209 percent of median, compared to 63 percent last year. Precipitation in April was much below average, which brings the seasonal accumulation (Oct-Apr) to 121 percent of average. Soil moisture is at 67 percent saturation, compared to 70 percent last year. Storage in Lahontan Reservoir is 64 percent of capacity, compared to 88 percent last year. Forecast streamflow volumes for the East- and West Forks of the Carson River (May through July) are 210- and 200 percent of average, respectively.



Carson River Basin (cont'd)

CARSON RIVER BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
EF Carson R nr Gardnerville							
APR-JUL	330	366	390	210	414	450	186
MAY-JUL	280	302	317	210	332	354	151
WF Carson R at Woodfords							
APR-JUL	91	99	105	194	111	119	54
MAY-JUL	70	78	84	200	90	98	42

The average is based on the 1981-2010 reference period.

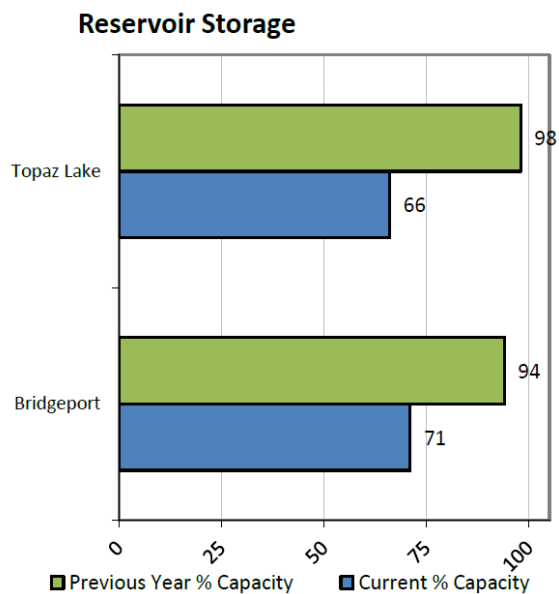
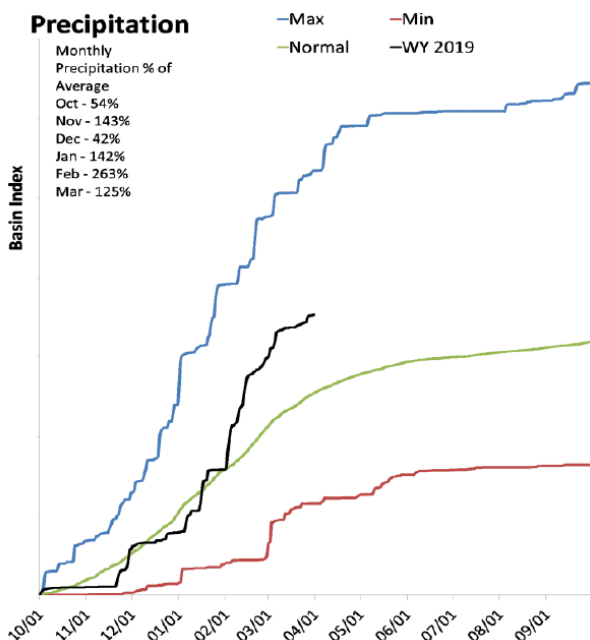
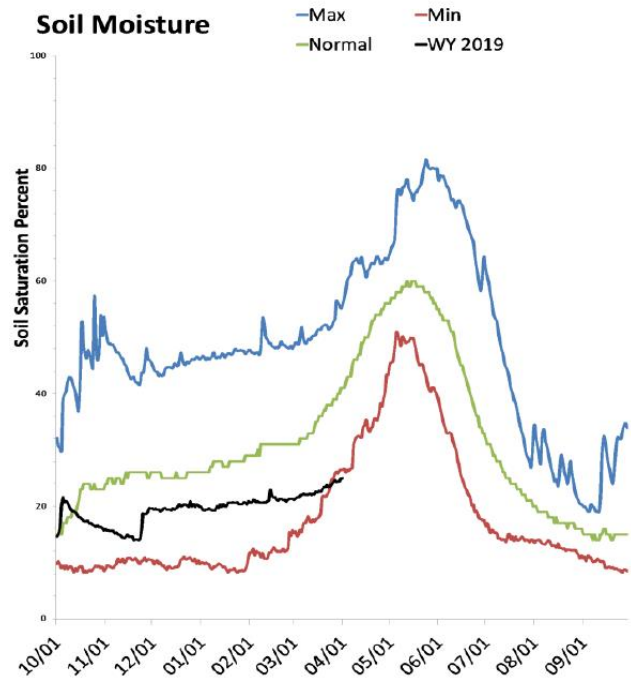
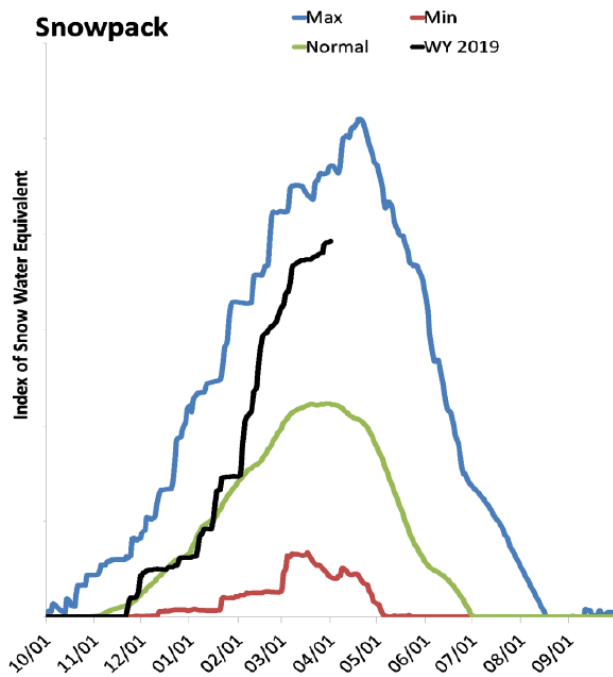
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Walker River Basin

Including information from the Water Supply Outlook Report for Nevada

(<https://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/>):

Snowpack in the Walker River Basin is much above normal at 180 percent of median, compared to 63 percent last year. Precipitation in April was much below average, which brings the seasonal accumulation (Oct-Apr) to 131 percent of average. Soil moisture is at 54 percent saturation, compared to 60 percent last year. Combined reservoir storage is 65 percent of capacity, compared to 96 percent last year. Forecast streamflow volumes are on the order of 200 percent of average.



Walker River Basin (cont'd)

WALKER RIVER BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
E Walker R nr Bridgeport							
APR-AUG	91	121	141	207	161	191	68
MAY-AUG	84	110	127	231	144	170	55
W Walker R bl L Walker R nr Coleville							
APR-JUL	292	310	320	198	335	350	162
MAY-JUL	255	275	290	204	304	324	142
W Walker R nr Coleville							
APR-JUL	305	320	330	202	345	360	163
MAY-JUL	277	293	305	213	317	333	163

The average is based on the 1981-2010 reference period.

- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Owens River Basin

California Department of Water Resources' (DWR's) streamflow forecast remains at 145 percent of average between April and September.

OWENS RIVER BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast							
Forecast Point Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Owens R (DWR) APR-SEP			334	145			231

The average is based on the 1981-2010 reference period.

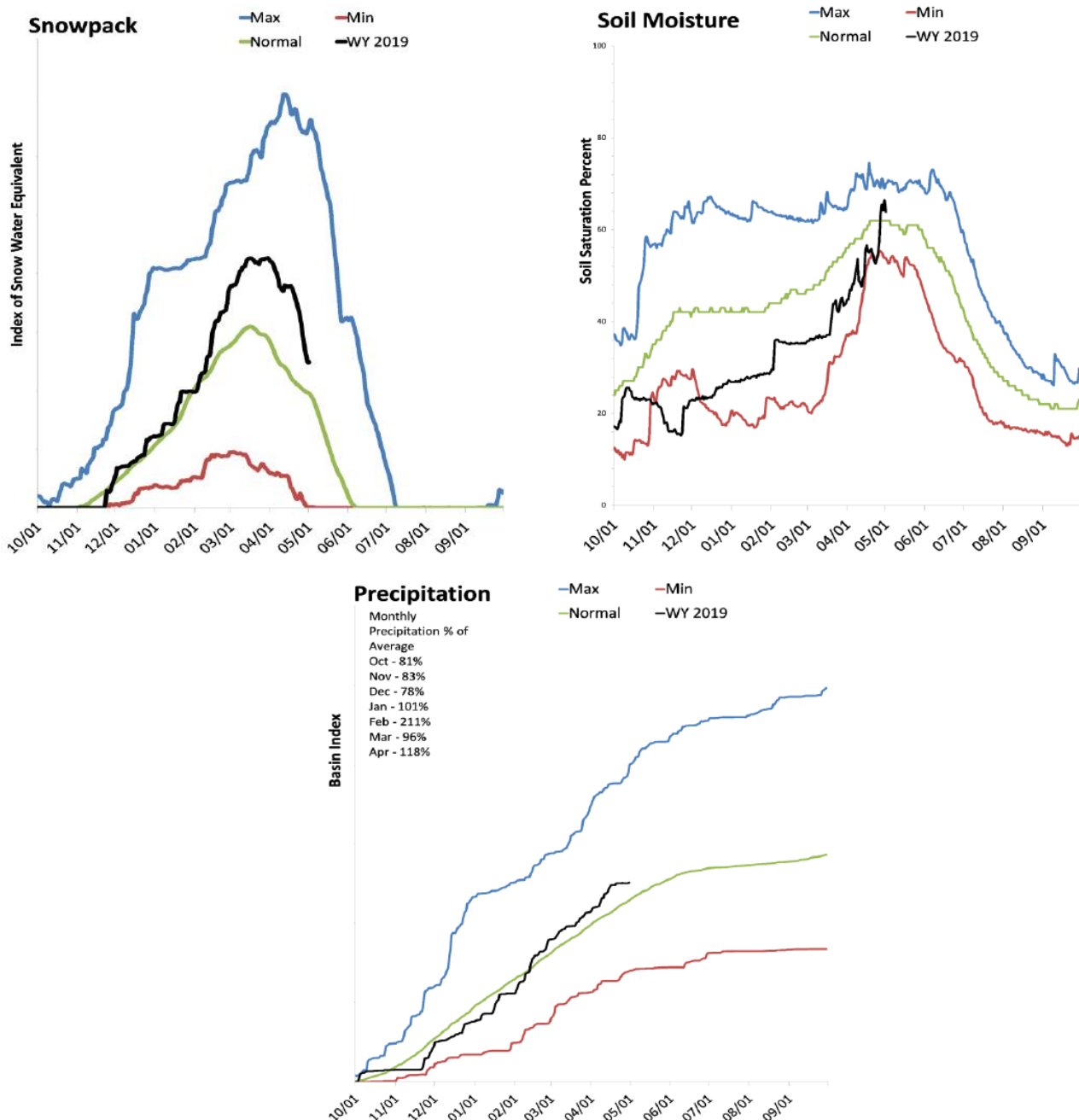
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

Northern Great Basin

From the Water Supply Outlook Report for Nevada

(<https://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/>):

Snowpack in the Northern Great Basin is above normal at 127 percent of median, compared to 58 percent last year. Precipitation in April was above average, which brings the seasonal accumulation (Oct-Apr) to 110 percent of average. Soil moisture is at 66 percent saturation, compared to 58% last year. *Streamflow forecasts for Davis Creek, Bidwell Creek and Eagle Creek have been discontinued until stream gaging can be re-established.*



Lower Colorado River Basin

Including information from the Water Supply Outlook Report for Nevada

(<https://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/>):

As of April 30, 2019, reservoir storage at Lake Mead was at 41 percent of capacity, up 380 thousand acre-feet (KAF) from this time last year. Snowpack in the Colorado River Basin above Glen Canyon Dam held steady at 134 percent of the median, compared to 73 percent last year. The forecast unimpaired streamflow volume for Lake Powell Inflow is 139 percent of average for May through July. Note that the actual flow will be dependent on upstream reservoir management and diversions.

Reservoir Storage End of April, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Mead	10767.0	10387.0	20158.0	26159.0
Lake Mohave	1685.0	1677.0	1678.0	1810.0
Basin-wide Total	12452.0	12064.0	21836.0	27969.0
# of reservoirs	2	2	2	2

COLORADO RIVER BASIN Streamflow Forecasts - May 1, 2019

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

Forecast Point Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	(% AVG.)	30% (KAF)	10% (KAF)	30 Yr Avg (KAF)
Lake Powell Inflow (2)							
APR-JUL	7970	8970	9690	135	10400	11600	7160
MAY-JUL	6730	7730	8450	139	9190	10400	6100

The average is based on the 1981-2010 reference period.

- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snowcourses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

This publication is posted with other Water Supply Outlook Reports for California at:
<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/snow/>.

For questions, contact Greg Norris, California NRCS, at Greg.Norris@usda.gov

To join a subscription list for future reports, send an email with "WSOR subscribe" in the subject header to Julia.Grim@usda.gov

Issued by

**Matthew Lohr, Chief
Natural Resources Conservation Service
U.S. Department of Agriculture**

Released by

**Carlos Suarez, State Conservationist
Natural Resources Conservation Service
Davis, CA**



YOU MAY OBTAIN THIS PRODUCT AS WELL AS CURRENT SNOW, PRECIPITATION, TEMPERATURE AND SOIL MOISTURE, RESERVOIR, SURFACE WATER SUPPLY INDEX, AND OTHER DATA BY VISITING OUR WEB SITE:

www.nrcs.usda.gov/wps/portal/nrcs/main/ca/snow/



California Water Supply Outlook Report

**USDA
Natural Resources Conservation Service
Davis, CA**

